

ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF ALLIED HEALTH SCIENCES
DEPARTMENT OF NURSING AND MIDWIFERY

ASSESSMENT OF KNOWLEDGE ABOUT HEPATITIS B
VACCINE AND VACCINATION STATUS OF NURSES
AGAINST HEPATITIS B VIRUS AT GOVERNMENTAL
HOSPITALS OF ADDIS ABABA; ETHIOPIA, 2015

BY:

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ADDIS ABABA, ETHIOPIA

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Abbreviations and Acronyms

Anti-HBs- hepatitis B surface antibody

Anti-HBc- hepatitis B core antibody

Anti-HCV- hepatitis C antibody

CI- Confidence interval

HBV - hepatitis B virus

HBsAg- hepatitis B surface antigen

HBeAg - hepatitis B e antigen

HBcAg- hepatitis B core antigen

HCV - hepatitis C virus

HIV - human immunodeficiency virus

HCWs -health care workers

HCC- hepatocellular carcinoma

NSSIs - needle stick and sharp injuries

OR- operation theatre

OR- odd ratio (AOR- Adjusted odd ratio; COR- Crude odd ratio)

PLC - primary liver cancer

SPSS-Statistical package for social sciences

USA-united states of America

WHO- world health organization

Abstract

Background: Health care workers (HCWs) are at increased risk of acquiring hepatitis B infection due to occupational exposure. A range of measures and interventions can contribute to reduce HBV transmission to HCWs to low levels. There is effective and safe vaccine against hepatitis B infection throughout the world many HCWs especially in resource poor countries remain at risk because they are not vaccinated against HBV.

Objective: To assess the knowledge about HBV vaccine and vaccination status against HBV of nurses at governmental hospital in Addis Ababa.

Method: Facility-based cross-sectional study was conducted among governmental hospital nurses of Addis Ababa from March to April 2015. The study population was selected among governmental hospital nurses of Addis Ababa. A total of 272 nurses were included in the study. Data was collected by using self-administered questionnaire. The collected data was analyzed by using SPSS version 20 statistical software. Descriptive statistics was used for determining results. Chi-square tests and binary logistic regression and multi variable logistic regression analysis was also used to characterize the association between the variables. P-value ≤ 0.05 was used for statistical significance.

Results: This study found the mean knowledge score for HB vaccine to be 8.38 with standard deviation of 2.50. More than half of study participants (51.8%) had poor knowledge about the HB vaccine. Among the study participants only 67(24.4%) were vaccinated at least once in their life time. Out of those respondents who were vaccinated, only 35.8% were fully vaccinated. This study also identified vaccination status was associated with factors like the hospital where the respondents were working, hospital wards, history of exposure to needles and sharp injury and knowledge of respondents about the vaccine.

Conclusion: This study identified knowledge of respondents about HB vaccine unsatisfactory and vaccination status of respondents to be very low.

Recommendation: Hepatitis B prevention and control implementation guideline and hepatitis B data has to be derived, and from this guideline each concerned bodies including governmental hospitals could work out their own strategy on hepatitis B.

Key words: HBV, Knowledge, vaccination status, Nurses, governmental hospitals

1. Introduction

1.1 Background

Hepatitis B virus (HBV) infection is one of the major diseases of mankind caused by the hepatitis B virus and has shown to cause serious public health problem. It is estimated that about 2 billion people are infected with HBV worldwide; of which more than 350 million have chronic HBV and 1.2 million die from chronic hepatitis, cirrhosis and hepatocellular carcinoma(HCC)(1).

HBV infection is the tenth leading cause of death among all diseases worldwide. HBV infection accounts for 500,000 to 1.2 million deaths each year. The long-term major adverse outcomes of chronic HBV infection are primary liver cancer (PLC) and liver cirrhosis. Approximately 15–40% of infected patients will develop cirrhosis, liver failure, or HCC(1).

The global prevalence of HBV infection varies widely. Its endemicity ranges from high ($\geq 8\%$) to intermediate (2-7%) and low ($< 2\%$) and also varies in different geographic areas of the world, as well as in different population subgroups(2). Overall, approximately 45% of the global populations live in areas of high chronic HBV prevalence(1).

The burden of hepatitis B virus infection is highest in the developing world particularly Asia and sub-Saharan Africa. World Health Organization (WHO) estimates that the prevalence of hepatitis B virus infection in Africa is on average more than 10%(3).

Ethiopia, being part of sub-Saharan region, is ranked as an area with medium to high endemicity for HBV infection, based on previous population surveys(2).Ethiopia which has significant Hepatitis B transmission in both children and adults displays around 6% to 12%hepatitis B surface antigen(HBsAg) prevalence(4).

Liver disease is known to be a significant cause of hospital admission in Ethiopia although the etiology of this disease is not well defined. Acute viral hepatitis, chronic hepatitis, cirrhosis of the liver and HCC account for 12% of hospital admissions and 31% of mortality on medical wards in Ethiopia (4)

The occupational risk of transmission of blood-borne pathogens, such as hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) to healthcare workers (HCWs) is well recognized. Among them, HBV is far more infectious than HCV, which is in turn considerably more infectious than HIV. Especially hepatitis B e antigen(HBeAg) positive individuals are highly infectious(5).

Contaminated needles cause 8–16 million HBV infections each year, compared with 2.3–4.7 million HCV infections, and 80,000–160,000 HIV infection(1).

Hepatitis B infection is transmitted through percutaneous (i.e., puncture through the skin) or mucosal (i.e., direct contact with mucous membranes) exposure to infectious blood or body fluids. Percutaneous transmission of HBV can occur from receipt of blood transfusion or organ or tissue transplant from an infectious donor, injection-drug use; including sharing of injection-preparation equipment and frequent exposure to blood or needles among health-care worker. The disease is one of the most serious of the 20 blood borne pathogens which are the major threat to HCWs. The most common routes of transmission from patient to HCW are needle stick and other sharps injuries (NSSIs), followed by mucocutaneous exposure. Persons with chronic infection also serve as the main reservoir for continued HBV transmission (5-7).

Throughout the world, millions of healthcare professionals work in health institutions and it is esteemed that 600,000 to 800,000 cut and puncture injuries occur among them per year. The annual proportion of HCWs exposed to blood borne pathogens was 5.9% for HBV, corresponding to about 66,000 HBV infections in HCWs worldwide(8).

Evidences indicated around 5%–10% of HBV infected workers become chronically infected. Estimated 100–200 health-care personnel have died annually during the past decade because of the chronic consequences of HBV infection (9).

According to a European survey of occupational exposure of HCWs to NSSIs, nurses were found to be exposed more commonly (91%) than doctors (6%) and phlebotomists (3%). There is a general consensus that nurses are at the greatest risk of an NSSI, with up to 50% of all NSSIs being sustained by this group(10).

A range of measures and interventions can contribute to reduce HBV transmission to HCWs to low levels and such measures include adoption of standard precautions and the use of safety devices. The introduction of HBV vaccines in the 1980s, however, is to be considered the major achievement in terms of prevention of HBV infection. HBV vaccination of HCWs and aiming at optimum immunization coverage is therefore a wise strategy(5).

Primary vaccination consists of 3 intramuscular doses of hepatitis B vaccine. The 3-dose vaccine series administered intramuscularly at 0, 1, and 6 months produces a protective antibody response in approximately 30%–55% of healthy adults aged <40 years after the first dose, 75% after the second dose, and >90% after the third dose(6).

1.2 Statement of the problem

Hepatitis B is an important, infectious occupational hazard for HCWs exposed to human blood. The high risk of infection is due to the high prevalence of virus carriers in the assisted population, the high frequency of exposure to blood and other bodily fluids, and the highly contagious nature of HBV(11).

Since contact with body fluid of an infected person, especially infected blood, is one of the principal modes of transmission of the causative virus of hepatitis B infection, HCWs constitute one of the high-risk groups for this infection(12). A study conducted in the United States found that HCWs had a prevalence of HBV infection approximately 10 times higher than the general population(13). WHO Report estimates that 40% of HBV infection is a result of occupational exposure, it has been estimated that 14.4% of hospital workers are infected with HBV. Nurses were most commonly exposed to infection (41%) than other HCWs(14).

A range of measures and interventions can contribute to reduce HBV transmission to HCWs to low levels. One among them is being vaccinated with the three dose HBV vaccine which is protective in more than 90% of users who have completed all the doses at 0, 1 and 6 months.

Ninety percent of healthy adults and 95 percent of infants, children, and adolescents have protective serum anti-HBs antibody (anti-HBs) concentrations after the vaccine series has been completed. Among immunocompetent persons in whom antibody levels of at least 10 mIU per milliliter develop, the efficacy of the vaccine is nearly 100 percent(15).

In spite of availability of safe and effective vaccine against HBV throughout the world many HCWs especially in resource poor countries remain at risk because they are not vaccinated against HBV (16). The reason for not being vaccinated may be lack of knowledge about the vaccine. In Ethiopia there are only few studies conducted on knowledge and vaccination status of hepatitis B vaccine among HCWs but there are no studies conducted specifically on nurses who are at increased risk in comparison to other HCWs. This study assessed the knowledge about HBV vaccine and vaccination status against hepatitis B among nurses working at governmental hospitals in Addis Ababa. Based on the finding conclusions and recommendations was made.

1.3 Significance of the study

Prevention is the only safe strategy against high prevalence of HBV. One among the different prevention means is giving vaccination for HCWs. Like other HCWs nurses are at a higher risk of acquiring HBV infection compared to the general population.

This study assessed the knowledge and vaccination status of nurses against HBV at governmental hospitals of Addis Ababa and enabled to identify the knowledge and vaccination status of the nurses in the study population.

The result of this would assist policy makers, the ministry of health, hospital and clinical facility managers, governmental and non-governmental organizations to be aware of the knowledge of nurses about HB vaccine and their status of vaccination against the virus in governmental hospitals in Addis Ababa and help them to develop strategies for promoting vaccine utilization amongst nurses. The outcome of this study could also be used as a base line evidence for further study.

2. Literature review

A variety of studies related to HBV and its vaccine were found. Only those that found to be relevant to this study were included. The different literatures found were summarized in to prevalence of HBV infection in HCWs and Knowledge about HB vaccine and vaccination status.

2.1 Prevalence of HBV infection in HCWs

A study conducted in Mexico assessed prevalence of positive markers for hepatitis B (HBV Ags) and hepatitis C (Anti-HCV) in health personnel. The study included a total of 374 HCWs, seven subjects (1.8%) were positive, 5 for anti-HCV antibodies (1.3%) and 2 for HBsAg (0.5%)(17).

A prospective prevalence study conducted in Brazil employed 1,433 HCW and 872 administrative employees of a selected hospital and 2,583 blood donor candidates from the Hospital Blood Bank. According to this study the prevalence of HBV among HCW (0.8%) was significantly higher than in blood-donor candidates (0.2%). Among the occupational factors, time in service contributed to a 14% increase in the chances of having positive serology, and work-related injuries increased the risk of HBV infection 4.29 times. The maximum risk sector presented a larger number of HCW with positive anti-HBc serology. There was a higher seroconversion in HCW who received the full set of HBV vaccines. In HCW with positive serology, the factors that presented greatest risks were time in service, work-related injuries and maximum risk sector(18).

A study conducted to assess HBV Infection in HCWs at Albania involved 480 HCWs. Out of which 92 were physicians, 246 were nurses/techniques, 120 were auxiliary workers and 22 were office workers. According to this study the HBsAg, anti-HBc and anti-HCV prevalence were 8.1%, 70% and 0.6%, respectively. The highest (11.4%) HBsAg prevalence was observed in the youngest age group (20–30 years of age). High HBsAg prevalence (7.2–7.5%) was detected also in age groups above 30 years. The highest HBsAg prevalence (12.6%) was found in the auxiliaries. The anti-HBc prevalence increased significantly with age from 59% in HCWs younger than 39 years to 87% among those older than 50 years. After adjustments for different job categories, age older than 40 years remained independently associated with anti-HBc positivity (OR(odd ratio) = 2.9; 95% CI 1.9–4.6) and inversely associated with the lack of HBV immunity or infection markers (OR = 0.4; 95% CI 0.2–7)(19).

A study conducted in India assessed the Prevalence of hepatitis B vaccination among 300 oral health care personnel. The study found out of 300 oral health care personnel 256 (85.4%) were vaccinated for HBV infection and 44 (14.6%) had not taken vaccination. Highest frequency of vaccination was seen among dentists and least amongst dental lab technicians and other workers. This difference was highly significant among the different occupation groups ($p=0.001$)(20).

A prospective study conducted in Pakistan assessed the Prevalence of HIV, hepatitis B and C amongst HCWs and the result indicated that 5.6% for antibodies to HCV, 2.4% for HBsAg, while none of those studied had antibodies to HIV(21).

A study conducted in Korea to assess sero prevalence of HBV among HCWs employed a total of 571 HCWs (56 physicians, 289 nurses, 113 technicians and 113 aid-nurses) aged between 21 and 74 years. According to this study the positive rates of HBsAg and anti-HBs were 2.4% (14/571) and 76.9% (439/571), respectively. Of the 439 anti-HBs positive cases, 320 cases (73.1%) were anti-HBc negative and this was significantly associated with a past history of HBV vaccination(22).

A study conducted in a Nigerian tertiary health institution to assess the sero prevalence of hepatitis B surface antigenemia among health care workers participate total of 420 staff members. Based on this study 18 were positive for HBsAg giving a prevalence of 4.3%. out of the eighteen, 9(50%)of those that were positive for HBsAg were ward maids/attendants, 6(33%) were nurses, 2(11%)were administrative staff and 1(6%)was a health record staff(23).

A cross sectional survey conducted in Uganda among 370 HCWs shows that sero-prevalence of current HBV infection was 8.1% and prevalence of life time exposure to HBV infection was 48.1%. Prevalence of needle stick injuries and exposure to mucous membranes was 67.8% and 41.0%, respectively. Consistent use of gloves was reported by 55.4% of respondents. Only 6.2% of respondents were vaccinated against hepatitis B virus infection and 48.9% were susceptible and could potentially be protected through vaccination. Longer duration in service was associated with a lower risk of current infection ($OR = 0.13$; $p \text{ value} = 0.048$). Being a nursing assistant ($OR = 17.78$; $p \text{ value} = 0.007$) or a laboratory technician ($OR = 12.23$; $p \text{ value} = 0.009$) were associated with a higher risk of current HBV infection. Laboratory technicians ($OR = 3.99$; $p \text{ value} = 0.023$) and individuals with no training in infection prevention in last five years ($OR = 1.85$; $p \text{ value} = 0.015$) were more likely to have been exposed to hepatitis B virus infection before(24).

2.2 HB vaccine Knowledge

Cross-sectional study conducted in Morocco to assess knowledge and perception of hepatitis B enrolled 420 HCWs. Out of them, Fifteen (5%) had a history of hepatitis B. All HCWs considered that HBV infection may be acquired through blood exposure. Vaccination was acknowledged as a necessary means against HBV transmission by 276 (98%) HCWs. Forty-two percent HCWs had no HBV serological markers. The prevalence of hepatitis B surface antigen among participants was 1%. The mean prevalence of hepatitis B core antibody (anti-HBc) was 28% and was significantly higher ($P=0.05$) among nursing auxiliaries (57%), nurses (30%), medical physicians (31%) and midwives (25%) than among laboratory technicians (13%). According to the vaccination registers (available in two sites), vaccination (≥ 3 doses) was 55%. Vaccination was 75% among midwives, 61% among nurses, 53% among nursing auxiliaries and 38% among medical staff. Of the fully vaccinated HCWs without anti-HBc, 51% had serological evidence of protection(25).

A descriptive cross-sectional study conducted in Nigeria to assess knowledge of HBV infection, risk perception, vaccination history, and challenges to control hepatitis among health workers in a tertiary care hospital enrolled 382 HCWs. The respondents comprised 94 (25%) medical doctors, 168 (44%) nurses, 68 (18%) medical laboratory technologists, and 52(14%) pharmacists. Out of the 382 participants over 33% had poor knowledge about the HBV vaccine and 35% were not immunized against HBV. Predictors of good knowledge include age less than 35 years, male sex, being a medical doctor, previous HBsAg test, and complete HBV immunisation(26).

Another a cross sectional study conducted in 88 HCWs to assess the knowledge, attitude and practice of hepatitis B vaccination among health workers at the Nigerian Lagos State accident and emergency center. Of those involved HCWs on the study majority (70.2%) had good knowledge of HBV infection and vaccination and the mean knowledge score (%) was 61.2 ± 20.7 . Majority (90.4%) knew that HBV can be acquired through a needle stick injury. Majority of participants (67.9%) were aware of the existence of an effective vaccine against hepatitis B infection. Most participants of the study (86.9%) knew that a complete dose of hepatitis B vaccine is 95% effective; however, only 49.4% knew for how long the vaccine protects. Only 36.9% knew correctly that HBV is 100 times more infectious than HIV. Attitude towards hepatitis B vaccination was good among all of the respondents. Majority of participants (84.5%) had poor practice of hepatitis B vaccination and the mean practice score (%) was 24.2 ± 25.0 . Among those who did not receive the

vaccine, majority (67.6%) gave non-availability of the vaccine as reason for not being vaccinated(27).

Across sectional study conducted in Bahirdar city administration to assess hepatitis B vaccine knowledge and vaccination status among health care workers enrolled a total of 370 participants. Out of the 370 participants 64.7% perceived their risk of acquiring hepatitis B infection very high or high. Only 52% of the respondents were found to be knowledgeable about hepatitis B infection. In this study only 62% of health care workers were knowledgeable about hepatitis B vaccine. From the total of 370 respondents only 20(5.4%) reported that they took three or more doses of hepatitis B vaccine(28).

2.3 Vaccination status and barriers for vaccination

A cross sectional survey conducted in USA to assess the HB vaccination coverage levels among HCWs has chosen a representative sample of 425 of 6,116 American Hospital Association member hospitals by selecting 25 HCWs from each hospital. This study indicated among at risk HCWs, 75% had received 3 or more doses of the HB vaccine, corresponding to an estimated 2.5 million vaccinated hospital based HCWs. The coverage level was 81% among staff physicians and nurses. Compared with nurses, coverage was significantly lower among phlebotomists (71.1%) and nurses' aides and/or other patient care staff (70.9%; $P<.05$). Hepatitis B vaccination coverage was highest among white HCWs (79.5%) and lowest among black HCWs. (67.6%; $P<.05$). In addition this study indicated compared with HCWs who worked in hospitals that required vaccination only of HCWs with identified risk for exposure to blood or other potentially infectious material, HB vaccination coverage was significantly lower among HCWs who worked in hospitals that required vaccination of HCWs without identified risk for exposure to blood or other potentially infectious material (76.6% vs. 62.4%; $P<.05$) (29).

A cross-sectional study was conducted on 1,808 public-sector HCWs in Southeastern Brazil to assess Hepatitis B vaccination and occupation exposure in the health care sector. This study revealed out of the total HCWs selected 85.6% declared vaccinated, although only 74.9% of the vaccinated professionals had received a complete immunization schedule. Not having been vaccinated was associated with not having a partner; having high school, technical or incomplete

higher education level; work characteristics such as working in surveillance or the administrative/general services sector; and not using personal protection equipment(30).

A study conducted in Greece to assess vaccination coverage against hepatitis B virus in HCWs and predictive factors possibly associated with the likelihood of vaccination in regional general hospital has shown among 175 HCWs, overall vaccination coverage was 57.1%. Logistic regression analysis revealed that occupation and use of gloves were independently associated with the likelihood of vaccination against HBV. Doctors recorded an odds ratio (OR) for vaccination of 4.45 in comparison with nurses/paramedics. According to this study HCWs who wore gloves always/most times demonstrated an odds ratio of 2.79 for vaccination against HBV in comparison with those who never/rarely used(31).

Again a cross-sectional study was conducted among HCWs of a tertiary care centre in north India to assess coverage of HB vaccination and factors relating to its acceptance among HCWs. This study has shown the overall prevalence of hepatitis B vaccination acceptance was 60%. Only 40% of the health workers had received the full three dose vaccination schedule while 20% had received one or two doses, and 40% were unvaccinated. The most important reasons for not taking the vaccine was negligence (41.6%), whereas the commonest (45%) ground cited for not taking the recommended number of dosage was the lack of knowledge about the total number of doses to be taken for full protection. Reasons for acceptance of the vaccine included vaccine safety (AOR= 6.57, 95% CI= 2.64-16.04) followed by history of exposure to blood (AOR= 5.21, 95% CI= 1.81-16.16) and acceptable knowledge about the disease (AOR= 4.76, 95% CI= 1.13-11.45) (12).

In a study conducted in Pakistan to assess the Prevalence of HBV and HB vaccination coverage in HCWs of tertiary hospitals of Peshawar a total of 824 HCWs were randomly selected from three major hospitals. HCWs in the studied hospitals showed 2.18% prevalence of positive HBV. Nurses and technicians were more prone to occupational exposure and to HBV infection. There was significant difference between vaccinated and non-vaccinated HCWs as well as between the doctors and all other categories. Barriers to complete vaccination, in spite of good knowledge of subjects in this regard were work pressure (39.8%), negligence (38.8%), unaffordability (20.9%), and unavailability (0.5%)(32).

A study conducted in Syria to assess Hepatitis B vaccination status and needle stick injuries (NSIs) among HCWs enrolled a total of 321 participants. The result of this study revealed 246 (76.6%) HCWs had sustained at least one NSI during 2008. Nine (2.8%) had HBV chronic infection and 75 HCWs (23.4%) were never vaccinated. Anesthesiology technicians had the greatest exposure risk when compared to office workers [OR = 16.95% CI (2.55-100), $P < 0.01$], doctors [OR = 10.95% CI (2.1 47.57), $P < 0.01$], and nurses [OR = 6.75, 95% CI (1.56 29.03), $P = 0.01$]. HCWs under 25 and between the age of 25 and 35 years were at increased risk for NSI when compared to HCWs older than 45 years [OR = 3.12, 95% CI (1.19-8.19), $P = 0.02$] and [OR = 3.05, 95% CI (1.42-6.57), $P < 0.01$], respectively(33).

A study conducted to assess Hepatitis-B vaccination status among dental surgeons in Nigeria revealed the occupational risk of contracting hepatitis-B infection among dental surgeons was rated as either high or very high by 51 (72.9%) of the respondents. Amongst the respondents, 14 (20.0%) had received three doses of the hepatitis B vaccine, 34 (48.6%) either two doses or a single dose, and 22 (31.4%) were not vaccinated. The major barriers reported among the respondents who were not vaccinated were lack of opportunity and the fear of side effects of the vaccines. The suggested ways to increase the vaccination rate among the respondents in descending order include: Making the vaccine available at no cost (51.4%), educating dentists on the merits of vaccination (17.1%), and using the evidence of vaccination as a requirement for annual practicing license renewal (14.3%) and for the employment of dental surgeons (11.4%) and others (2.9%)(34).

A study conducted in Burkina Faso to assess hepatitis B vaccination status and associated factors among HCWs involved a total of 452 HCWs. Among them, 47.7 % had received at least one dose of HBV vaccine. The full immunization coverage against HBV was estimated at 10.9 %. Factors associated with vaccination status were age ($p=0.005$), occupation ($p=0.005$), and seniority in the profession ($p=0.001$). Anti-HBs was found in 61.6 % of respondents, with significant differences ($p=0.01$) between subjects who received at least one dose of vaccine (76.7 %) and those who reported never having been vaccinated (50.3 %)(35).

Finally the different literature available indicated the long term severity of HBV infection. The literature available also indicated the infection can be preventable by vaccination. The transmission of HBV is also common among HCWs. With regard to vaccination status of HCWs against HBV the available literature indicated over all vaccination status is low in spite of differences from place

to place and also from profession to profession. This study indicated the knowledge of nurses about HBV vaccine and their vaccination status at hospitals of Addis Ababa.

2.4 Conceptual Framework

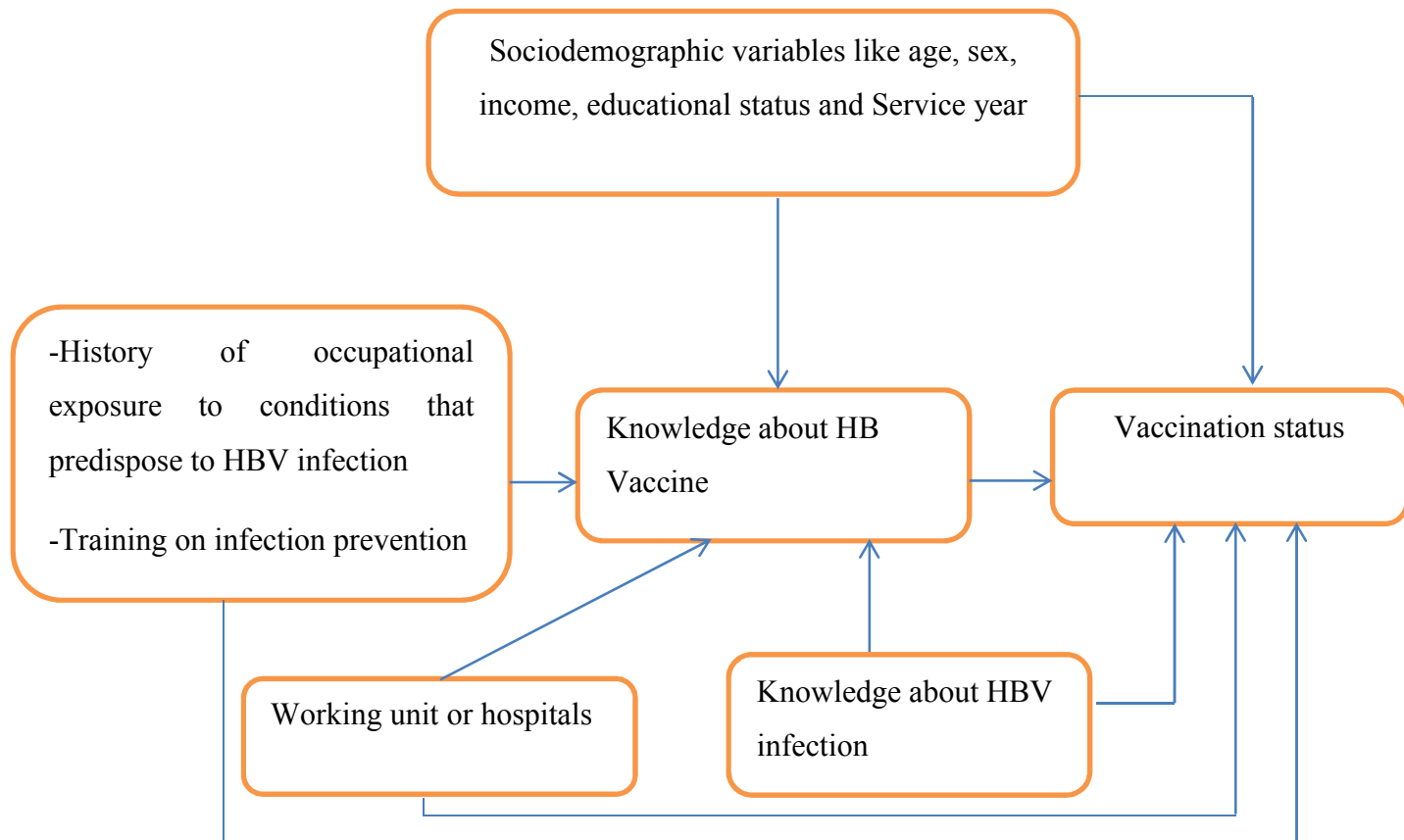


Figure 1: Conceptual frame work (developed by the investigator based on findings from other similar studies conducted in HCWs)(12, 28)

3. Objectives

3.1 General objective

To assess the knowledge about HBV vaccine and vaccination status against HBV of nurses at governmental hospital in Addis Ababa

3.2 Specific objectives

- To assess the knowledge of nurses about HB vaccine
- To determine the vaccination status of nurses against HBV
- To assess factors affecting knowledge of nurses about the vaccine and their vaccination status

4. Methods and Materials

4.1 Study area

This study was conducted in hospitals of Addis Ababa which is the capital city of Ethiopia. It is the largest city in Ethiopia, with a population of 3,384,569 according to the 2007 population census with annual growth rate of 3.8%(36). As compared to other regions of Ethiopia, Addis Ababa has highest concentration of health care facilities and health professionals. Nurses share the highest number among the estimated 10,000 health professionals that needs to cater for health related needs of the city's 3.3 million people (36).

The city has 12 public hospitals. These are Black lion hospital, St. Paul's hospital, Yekatit 12 hospital, Gandhi memorial hospital, Rasdesta hospital, Zewditu hospital, Menilik hospital, St. Peter's hospital, Tirunesh-Beijing hospital, Alert center, Federal police referral and Army hospitals. The health system in the city which is also considered as the capital of Africa is a five-tier system: referral hospitals, regional hospitals, zonal hospitals, health centers (HC) and health posts.

4.2 Study design and period

Facility-based cross-sectional study was conducted from March to April 2015.

4.3 Population

4.3.1 Source population

All nurses working at the governmental hospital found in Addis Ababa.

4.3.2 Study population

All nurses working at the selected governmental hospitals of Addis Ababa during the study period.

4.4 Sample size and sampling technique

4.4.1 Sample size determination

The sample size was calculated using a formula for single population proportion considering the following assumptions. Confidence level = 95%, Critical value $Z_{\alpha/2} = 1.96$, Degree of precision $d = 0.05$. The proportion (p) of those HCWs who were knowledgeable about the vaccine in the Bahirdar study which was 0.62. 10% contingency for possible non-response was considered.

$$\text{Using } n = \frac{\left(\frac{Z_{\alpha}}{2}\right)^2 p(1-p)}{d^2}$$

Where;

n = sample size

Z = critical value = 1.96

P = proportion of those HCWs who were knowledgeable about HB vaccine in the Bahr Dar study (62%)

d = degree of precision = 0.05

$$n = \frac{(1.96)^2 (0.62(1 - 0.62))}{(0.05)^2}$$

$$n = 324$$

Population correction formula; $n/(1 + [n/N])$, was used since the target population is less than 10,000. Total number of nurses in the selected hospitals was found to be 1500. Accordingly the sample size was 267.

After considering contingency of 10% for non-response rate the final sample size was 294.

4.4.2 Sampling Technique

Five government hospitals in Addis Ababa (Black lion, Zewditu, Gandhi, St. Paul, and Rasdesta) were selected using simple random sampling (SRS). The sample size was proportionally divided in to each hospital based on the number of nurses in the hospital. The allocated number of nurses for each hospital was again proportionally divided in to each ward in the hospital based on the number of nurses in each ward, finally from the ward nurses were selected using simple random sampling.

Table 1: Allocation of the study participants from each of the selected hospitals

S.no	Name of hospitals	Total number of nurses	Sample obtained
1	Black lion	566	111
2	St. Paulo's	461	50
3	Ras Desta Dametew	91	18
4	Zewditu	252	90
5	Gandi	130	25
Total		1,500	294

Table 2: Allocation of nurse participants from each ward/ working unit of the selected hospitals

S.no	Name of hospitals	Total number of nurses in the ward				Sample obtained in the ward			
		Out patient	In patient	Emergency	Operation theatre (OR)	Out patient	In patient	Emergency	OR
1	Black lion	140	255	82	89	27	50	16	18
2	St. Paulo's	90	261	75	35	18	17	7	8
3	Ras Desta	35	32	15	9	7	6	3	2
4	Zewditu	93	85	34	40	17	51	15	7
5	Gandi	28	56	20	26	5	11	4	5

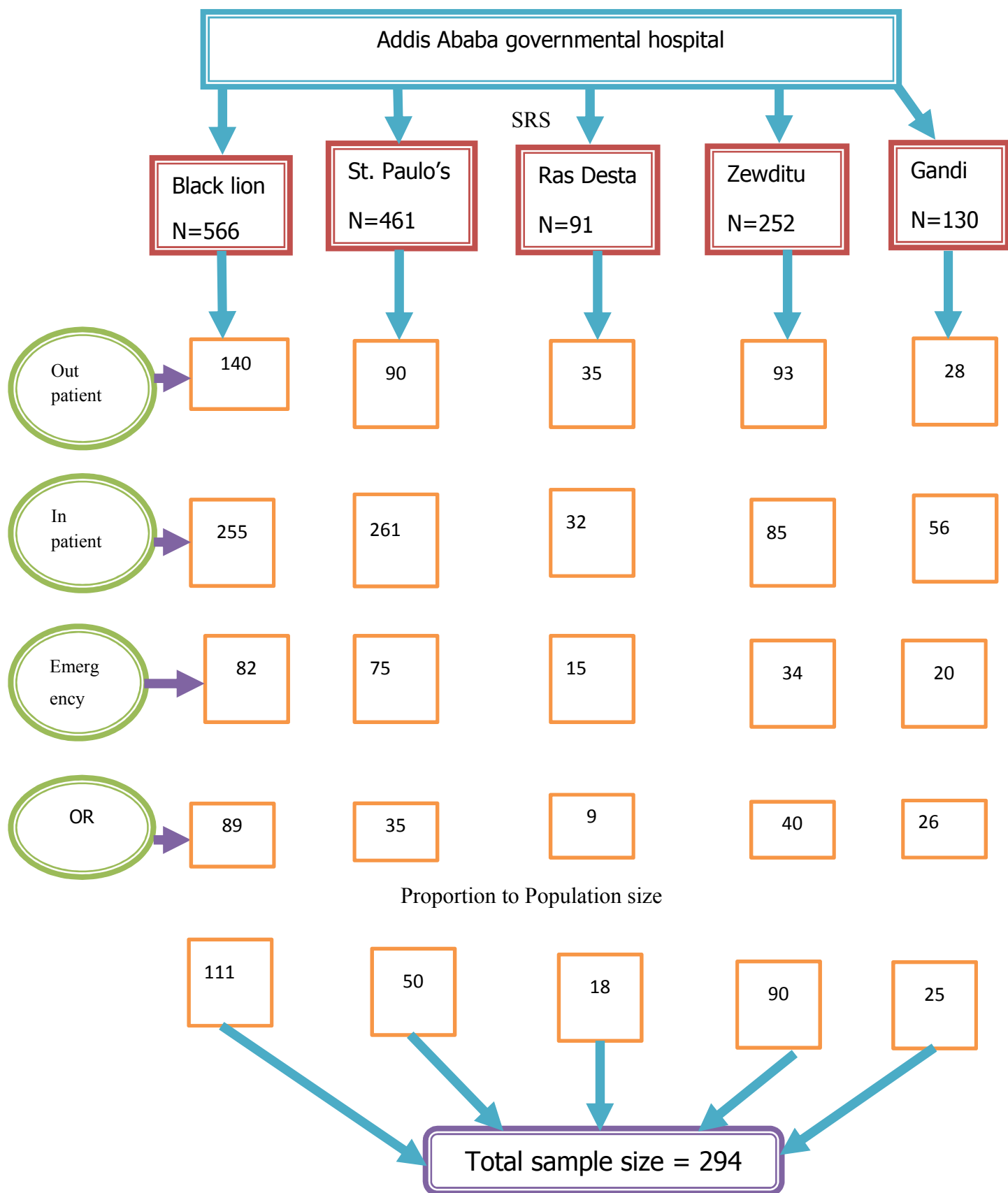


Figure 2: Schematic presentation of sampling procedure

4.5 Method and tools of data collection

The data was collected from study subjects by using structured, self-administered and pre-tested questionnaires developed by the researcher based on finding from other similar studies. The questionnaire consisted of questions divided into five sections that covered socio demographic characteristics, knowledge of respondents about the virus, history of occupational exposure to conditions that predispose to HBV infection and related factors, knowledge of respondents about the vaccine and vaccination status.

4.6 Variables

4.6.1 Independent variables

- Age
- Sex
- religion
- Marital status
- Educational status
- Income
- Service year
- Working unit/ward
- History of occupational exposure to conditions that predispose to HBV infection
- Training on infection prevention
- Knowledge about HBV infection
- Knowledge about HB Vaccine

4.6.2 Dependent variable

- Knowledge about HB Vaccine
- Vaccination status against HBV

4.7 Operational definitions

Good Knowledge about the vaccine: Refers to those study participants who scored point greater than or equal to the mean score of knowledge questions about the vaccine.

Poor knowledge about the vaccine: Refers to those study participants who scored point less than the mean score of knowledge questions about the vaccine.

Good Knowledge about the virus: Refers to those study participants who scored point greater than or equal to the mean score of knowledge questions about HBV.

Poor knowledge about the HB virus: Refers to those study participants who scored point less than the mean score of knowledge questions about HBV.

Vaccinated: Refers to those study participants who received at least one dose of HB vaccine.

Fully vaccinated: Refers to those study participants who received the recommended doses of the vaccine (Three doses on specified time gap)

Partially vaccinated: Refers to those study participants who received less than the recommended doses of the vaccine (only one or two doses) and those who took without schedule

Unvaccinated: Refers to those study participants who received no vaccine

Inpatient ward: study participants working at medical, surgical, pediatric, gyny-obs, oncology, post natal, delivery and ICU wards

Outpatient: study participants working at different OPDs like adult, child, ART, TB, eye clinic and antenatal wards

Nurse: Refers to those study participants who were working as nursing practitioner

4.8 Eligibility criteria

4.8.1 Inclusion criteria

- All registered nurses at selected governmental hospitals of Addis Ababa and who were available at the study period and willing to be included in the study.

4.8.2 Exclusion criteria

- Those who were absent from the hospitals for different reasons during study period
- Those nurses who were not willing to participate for different reasons

4.9 Data collection and management

The data was collected by using semi-structured questionnaire containing both open and close ended questions. Data was collected by pre trained data collectors. Registered nurses were recruited from other health facility for the data collection process and two days training was given on how to approach the respondents. After consent is obtained, the pretested questionnaire was self-administered to the selected participants. The filled questionnaire was collected on the next day to check for timely completion.

4.10 Data analysis

The collected data was coded, cleaned, entered and analyzed by using SPSS version 20 statistical software. Descriptive statistics was used for determining results. Chi-square tests and binary logistic and multi variable logistic regression analysis was also used to characterize the association between the variables. $P\text{-value} \leq 0.05$ was used for statistical significance. The result of the study was presented in the form of texts, tables and figures.

4.11 Data quality control

The questionnaire was pretested for its accuracy and consistency prior to the actual data collection process. The pretest was done on 5% of the sample size on a government hospital of Addis Ababa other than the selected hospitals for the study one week before the actual data collection period. Necessary modifications were made on the questionnaire after conducting the pretest. The principal investigator was assigned supervisors who were adequately trained for two days on the rules and regulations during data collection. Close supervision was under taken during data collection in a way that bias could not occur. The completeness, accuracy and clarity of the data collected were checked before data entry.

4.12 Ethical consideration

Before the start of the data collection process, letter of ethical clearance was secured from Ethics Review Board of Department of nursing and midwifery, Allied school of Health Science, College of Health Science Addis Ababa University. Letter of approval and cooperation was obtained from the university. Confidentiality of the information provided by the study participants was maintained throughout the study period. A statement was included at the top of the questionnaire requesting nurses not to include their identification and that by completing the questionnaire and handing it in, they are consenting to take part in the study.

4.13 Communication of the result

The result of the study will be disseminated to relevant bodies including the administrative bodies of the health facilities to be studied, Addis Ababa Health Bureau and Addis Ababa University. Finally, the finding from this study will be sent for publication to make it accessible for the scientific world.

5. Results

5.1 Socio-demographic characteristics of study participants

From the total of 294 nurses working on the selected hospitals and selected for this study, 272 were responded the questionnaire and included in the analysis making the response rate of 92.5%. Regarding socio demography of respondents 63.6% were females by sex. More than half (66.2%) of the respondents were in the age group 20-29 and the mean ($\pm$ SD) age of respondents was 30.3 ($\pm$ 8.2). Hundred sixty two (59.6%) of respondents were followers of orthodox Christianity followed by protestants (20.6%) and Muslims (19.1%). Most of respondents (58.5%) were single on marital status. The majority (73.2%) have Bsc degree (**Table 3**).

Of the total respondents 37.5% were working at Black lion hospital followed by Zewditu hospital (30.9%), Saint Paul hospital (16.9%), Gandhi hospital (8.5%) and Rasdesta hospital (6.3%). Regarding their working place in the hospitals the majority (45.2%) work at the inpatient ward followed by outpatient ward, emergency ward and OR (24.3%, 16.2% and 14.3% respectively). The mean ($\pm$ SD) service year of respondents was 6.9 ($\pm$ 7.5) years. The mean ($\pm$ SD) monthly income of respondents was 3380.93 ($\pm$ 1214.49) (**Table 3**).

Table 3: Socio demographic characteristics of nurses at Addis Ababa governmental hospitals, June, 2015

Sociodemographic characteristics	Frequency	Percent (%)
Sex		
Male	99	36.4
Female	173	63.6
Age		
20-29	180	66.2
30-39	59	21.7
40-49	11	4.0
$\geq$ 50	22	8.1
Marital status		
Single	159	58.5
Married	108	39.7
Separated/divorced	5	1.8



Religion		
Orthodox	164	60.3
Protestant	56	20.6
Muslim	52	19.1
Educational status		
Degree (BSc)	199	73.2
Diploma	67	24.6
Master degree	6	2.2
Working unit		
Inpatient	123	45.2
Out patient	66	24.3
Emergency	44	16.2
OR	39	14.3
Service years		
<10	216	79.4
10-19	33	12.1
≥20	23	8.5
Monthly income		
<2600	71	26.1
2600-3445	106	39.0
3446-4289	39	14.3
≥4290	56	20.6

5.2 History of occupational exposure to conditions that predispose to HBV infection and training on infection prevention

Regarding exposure to conditions that might lead to HBV infection 176 (64.7%) of participants said they had history of exposure to blood or body fluids on intact skin in the past 12 months. Eighty seven (32%) said they had history of splash of blood or body fluids to eye or mouth in the past 12 months and 105 (38.6%) of the respondents said they had history of blood on cut or unprotected skin. Regarding exposure to needles and sharp injury 115 (42.3%) had exposed to such a type of injury from the total 272. One hundred seventy one (62.9%) of respondents said they had taken training on infection prevention. Out of those who took training the majority (61.4%) had taken the training only once but the rest had trained more than once (**Table 4**).

Table 4: History of occupational exposure to conditions that predispose to HBV infection and training on infection prevention of nurses at Addis Ababa governmental hospitals, June, 2015

Question	Frequency	%
History of exposure to blood or body fluids on intact skin in the past 12 months		
Yes	176	64.7
No	96	35.3
History of splash to blood or body fluids to eye or mouth in the past 12 months		
Yes	87	32
No	185	68
History of splash of blood on cuts or unprotected skin in the past 12 months		
Yes	105	38.6
No	167	61.4
History of needles and sharp injures in the past 12 months		
Yes	115	42.3
No	157	57.7
Taken training on infection prevention		
Yes	171	62.9
No	101	37.1
Number of training		
Once	105	61.4
More than once	66	38.6

5.3 Knowledge about hepatitis B infection

Two hundred sixty seven (98.2%) of study participants said they have heard of hepatitis B infection. Among the respondents 128 (47.1%) wrongly said the symptoms of hepatitis B viral infection appear within few days after the entrance of HB virus in to the body. The majority of respondents (82.7%) said HBV has higher risk of transmission than HIV through needle stick injury. Regarding the organ affected by HBV the majority (87.1%) of the study participants correctly answered by choosing liver, while a small number of study participants incorrectly chosen kidney (4.4%), brain (4%), heart (3.3%) and other organs like the lung and the GIT (1.1%)(Table 5).

On route of transmission of HBV infection 93.8%, 89%, 87.5% and 84.2% of the respondents correctly cited blood and blood products, needle and sharp injury, sexual intercourse and vertically mother to child respectively as route of transmission for hepatitis B. But significant proportion of respondents incorrectly mentioned faeco-oral transmission (61.4%) and contaminated water (47.1%)(Table 5).

Knowledge of respondents on different methods for prevention of HB infection the majority (93.0%) correctly said HBV infection can be prevented by vaccination, 90.8% said by avoiding needle or sharp injury, 88.2% said by practicing standard working precautions and 84.6% said by avoiding unsafe sex. Still large proportion of respondents picked wrong ways for prevention of HBV transmission like avoiding drinking contaminated water (57.0%) and avoiding not well cooked foods (46.0%)(Table 5).

Table 5: Knowledge of nurses about HB infection at Addis Ababa governmental hospitals, June, 2015

Knowledge question	Frequency	%
Have you ever heard of Hepatitis B		
Yes	267	98.2
No	5	1.8
The symptoms of hepatitis B viral infection appear within few days Always after the entrance of Hepatitis B virus to the body		
Yes	128	47.1
No	144	52.9
HBV has Higher risk of transmission than HIV through needle stick injury		
Yes	225	82.7
No	47	17.3
Organ affected by HBV infection		
Liver	237	87.1
Heart	9	3.3
Kidney	12	4.4
Brain	11	4
Others (lungs, GIT)	3	1.1
Route of transmission		
Blood and blood products		
Yes	255	93.8
No	17	6.3

Needles and sharp injury		
Yes	242	89
No	30	11
Sexual intercourse		
Yes	238	87.5
No	34	12.5
Vertically from mother to child		
Yes	229	84.2
No	43	15.8
Faeco-oral		
Yes	167	61.4
No	105	38.6
Contaminated water		
Yes	128	47.1
No	144	52.9
Others®		
Yes	8	3
No	0	0
Methods for prevention of HBV transmission		
Vaccination		
Yes	253	93.0
No	19	7.0
Practicing standard working precaution		
Yes	240	88.2
No	32	11.8
Avoiding needle/sharp injury		
Yes	247	90.8
No	25	9.2
Avoid unsafe sex		
Yes	230	84.6
No	42	15.4
Avoid drinking contaminated water		
Yes	155	57.0
No	117	43.0
Avoid foods not well cooked		
Yes	125	46.0
No	147	54.0
Others methods		
Yes	7	2.6
No	0	0

® Others (kissing, contact through body lesion)

¥Others methods (avoid body fluids, blood transfusion)

Study participants were asked 16 item questions to assess their knowledge about HBV infection. The minimum and the maximum scores to the questions were 16 and 4 respectively. The mean knowledge score for HBV infection was 12.2 with standard deviation of 3.01. Finally the overall knowledge category of the study participants showed that more than half (55.1%) of the respondents had good knowledge about the infection by scoring mean and more than the mean score and the remaining 122(44.9%) had poor knowledge (**Figure 3**)

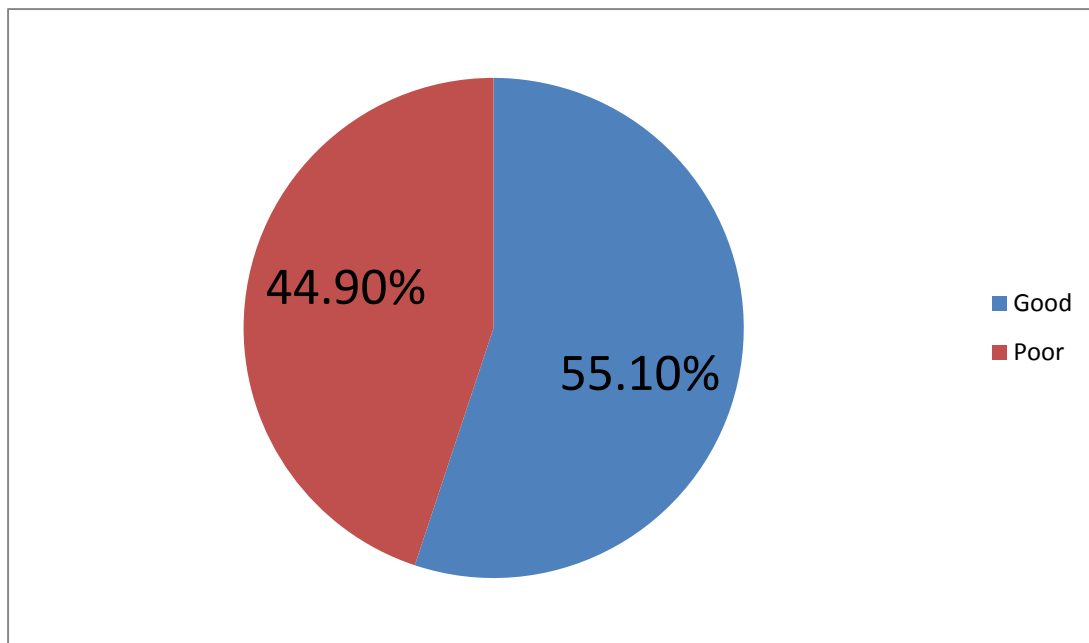


Figure 3: The overall knowledge of respondents about HBV infection at Addis Ababa governmental hospitals, June, 2015.

5.4 Knowledge about hepatitis B vaccine

Out of the different questions asked to assess knowledge of respondents about HB vaccine the majority (93%) of study participants said there is effective vaccine to prevent HB infection. Hundred eighteen (43.4%) of the respondents correctly said HB vaccine can be given as post exposure prophylaxis. According to 178 (65.4%) of respondents HB vaccine is contraindicated for immune compromised patients even though that is not the case. One hundred fifty (55.1%) of the respondents wrongly said HBV vaccine is effective to treat patients with acute HB infection. One hundred ninety nine (73.2%) of the study participants said HB vaccine should be given to health care workers as part of work place safety. Hundred fifty nine(58.5%) of study participants correctly

said full course of HB vaccine may give lifelong immunity but for health care professionals one further booster after five years after taking the first dose is recommended. Significant number of participants (47.1%) wrongly said after taking full dose vaccination of HB there is no need for a blood test to confirm immunity against HBV infection. Majority of study participants (71.3%) correctly said full dose HB vaccine provides 100% protection for 90% of adults. When asked whether full dose of HB vaccine protects against HBV infection for at least 15 years or not, about 62.9% correctly said yes it will protect but the rest said no. when asked whether HBV vaccine causes problem if given to people who are already immune or not, 66.2% of the respondents wrongly said yes it will cause but the rest said no. Finally 230 (84.7%) of the respondents correctly said HB vaccination is recommended for all health care workers (**Table 6**).

Table 6: Knowledge about hepatitis B vaccine of nurses at Addis Ababa governmental hospitals, June, 2015

Knowledge question about HB vaccine	Yes		No	
	Frequency	%	Frequency	%
There is effective vaccine to prevent hepatitis B infection.	253	93	19	7
Hepatitis B vaccine can be given as post-exposure prophylaxis.	118	43.4	154	56.6
Hepatitis B vaccine is contra indicated for immune compromised patients.	178	65.4	94	34.6
Hepatitis B vaccine is effective to treat patients with acute hepatitis B infection.	150	55.1	122	44.9
Hepatitis B vaccine is highly effective in preventing hepatitis B infection if given within 48 hours after exposure.	140	51.5	132	48.5
Hepatitis B vaccine should be given to health care workers as part of work place safety	199	73.2	73	26.8
Full course of hepatitis B vaccine may give lifelong immunity but for Health professionals, one further booster after 5 years of the first dose is recommended.	159	58.5	113	41.5
After taking full dose vaccination of hepatitis B, there is no need for a blood test to confirm immunity against hepatitis B	128	47.1	144	52.9
Full dose hepatitis B vaccine provides 100% protection for 90% of adults	194	71.3	78	28.7
Full dose hepatitis B vaccine protects against HBV for at least 15 years	171	62.9	101	37.1
Hepatitis B vaccine causes problems if given to people who are already immune	180	66.2	92	33.8
Hepatitis B vaccine is recommended for all health care workers.	230	84.6	42	15.4

The response of study participants about the number of doses of the vaccine that should be taken to get maximum protection, the majority (61%) said three dose followed by only one dose (16.5%), two doses (13.6%) and four doses (8.8%). Those study participants who said the protective dose of HB vaccine should be more than one dose (two, three or four doses) said the gap between 1st and 2nd dose should be less than one month (27.8%), one month (61.2%) and greater than one month (11%). Those study participants who said the protective dose is either three or four dose said the gap between 2nd and 3rd dose should be six month (65.8%), less than six month (23.7%) and greater than six month (10.5%) (**Figure 4**)

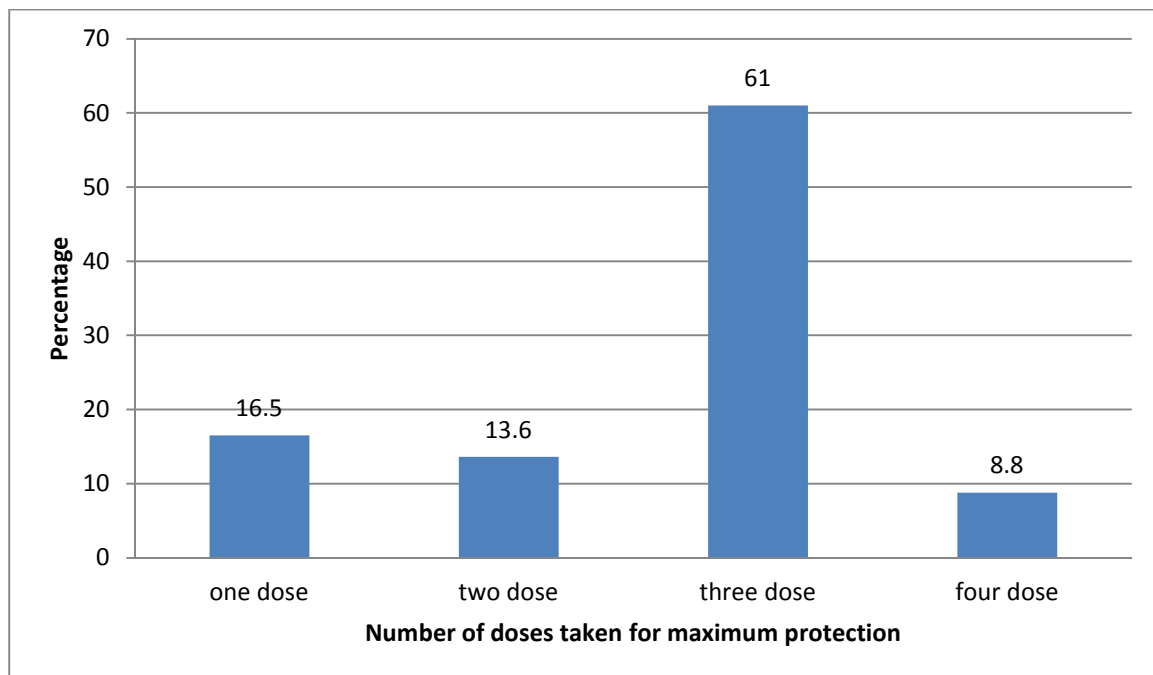


Figure 4: knowledge of nurses about the dose of HB vaccination to have maximum protection at Addis Ababa governmental hospitals, June, 2015.

Respondents were asked 15 item questions to assess their knowledge about HB vaccine. The minimum and the maximum scores to the questions were 14 and 3 respectively. The mean knowledge score for HB vaccine was 8.38 with standard deviation of 2.50. Overall assessment of knowledge of respondents about HB vaccine indicated 131 (48.2%) had good knowledge about the HB vaccine by scoring mean and more than the mean score and the rest 141 (51.8%) had poor knowledge (**Figure 5**).

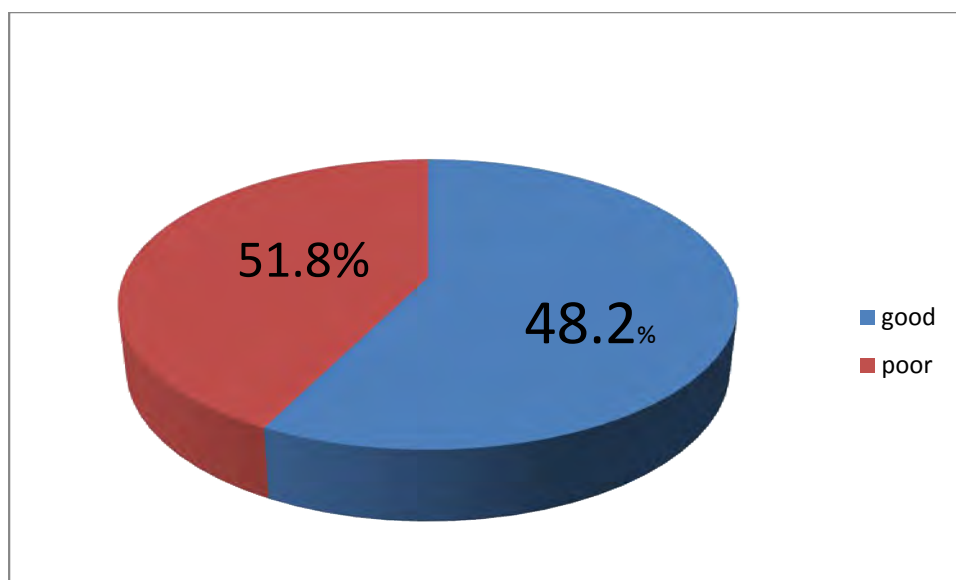


Figure 5: The overall knowledge of nurses about HB vaccine at Addis Ababa governmental hospitals, June, 2015.

5.5 Vaccination status

The vaccination status of respondents only 67(24.6%) were vaccinated at least once in their life time. Out of those respondents who were vaccinated, only 35.8% were fully vaccinated (**Figure 6**).

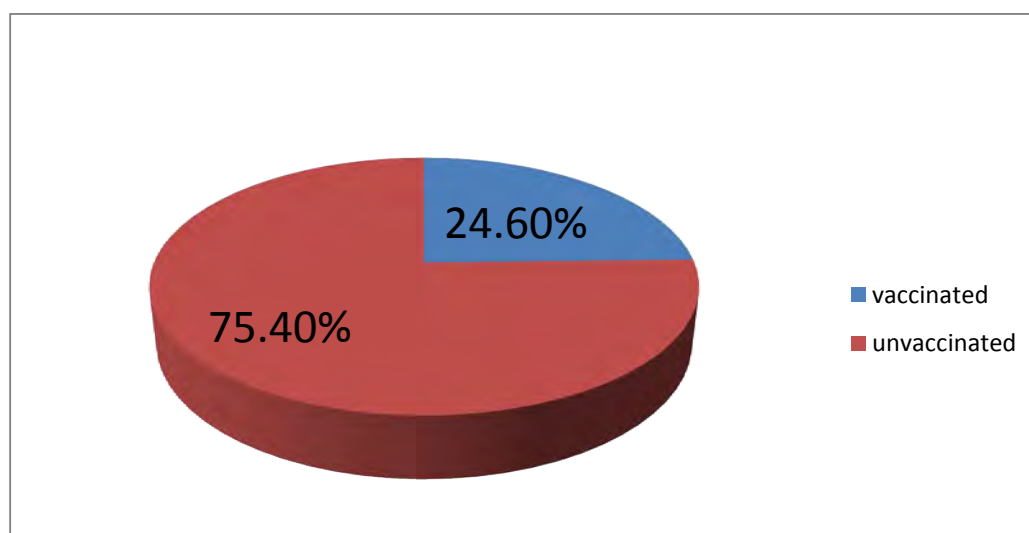


Figure 6: The overall vaccination status of nurses at Addis Ababa governmental hospitals, June, 2015.

The reasons for not being vaccinated among those who were not vaccinated included cost of the vaccine (unaffordability) (35.1%), Unavailability of the vaccine through the government channels (29.8%), not feeling the vaccine protective (17.1%), not knowing presence of vaccine for HBV infection and other reasons (2.9%) like being new employ, negligence and fear of side effects of the vaccine (**Figure 7**).

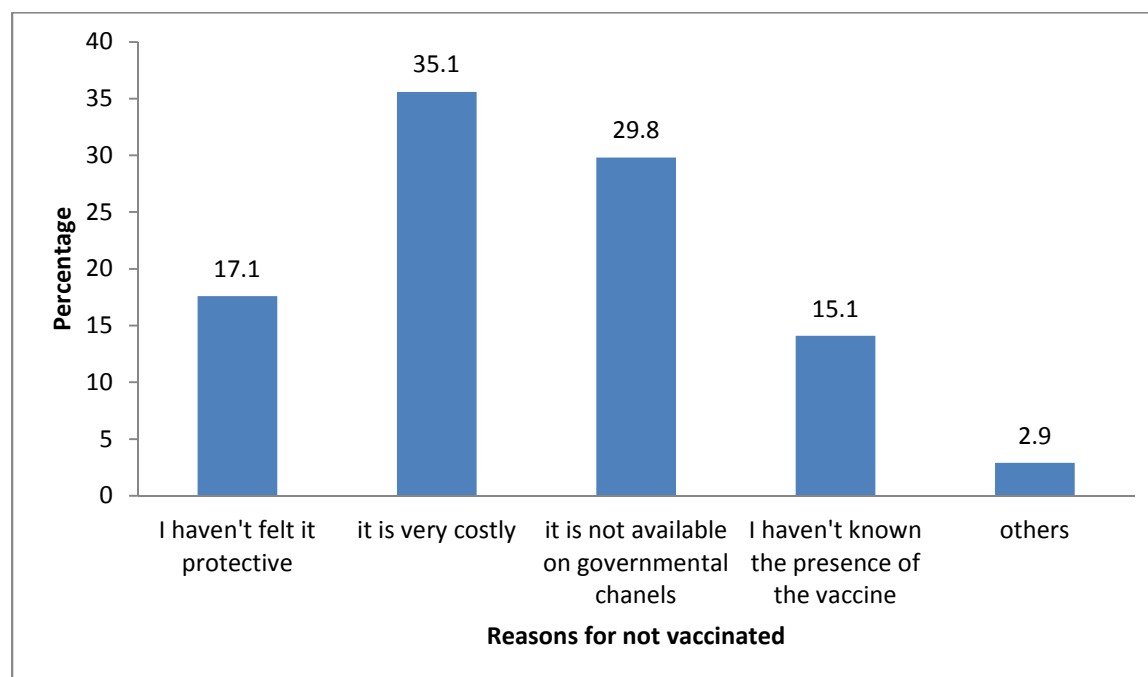


Figure 7: Reasons for not vaccinated against HBV of nurses at Addis Ababa governmental hospitals, June, 2015.

Among those study participants who were vaccinated, the majority (40.3%) received three doses followed by two doses (37.3%) and one dose (22.4%).

Those study participants who were vaccinated but taken less than the maximum protective dose (three dose) explained the reason for not taking the full three dose being cost of the vaccine (30%),not knowing the presence of additional dose (17.5%), not considering the additional dose important(17.5%), unavailability of the vaccine through governmental channels (15%) and other reasons (20%) like fear of side effects, waiting for the 3rd dose after taking the second and considering the already taken dose sufficient (**Figure 8**).

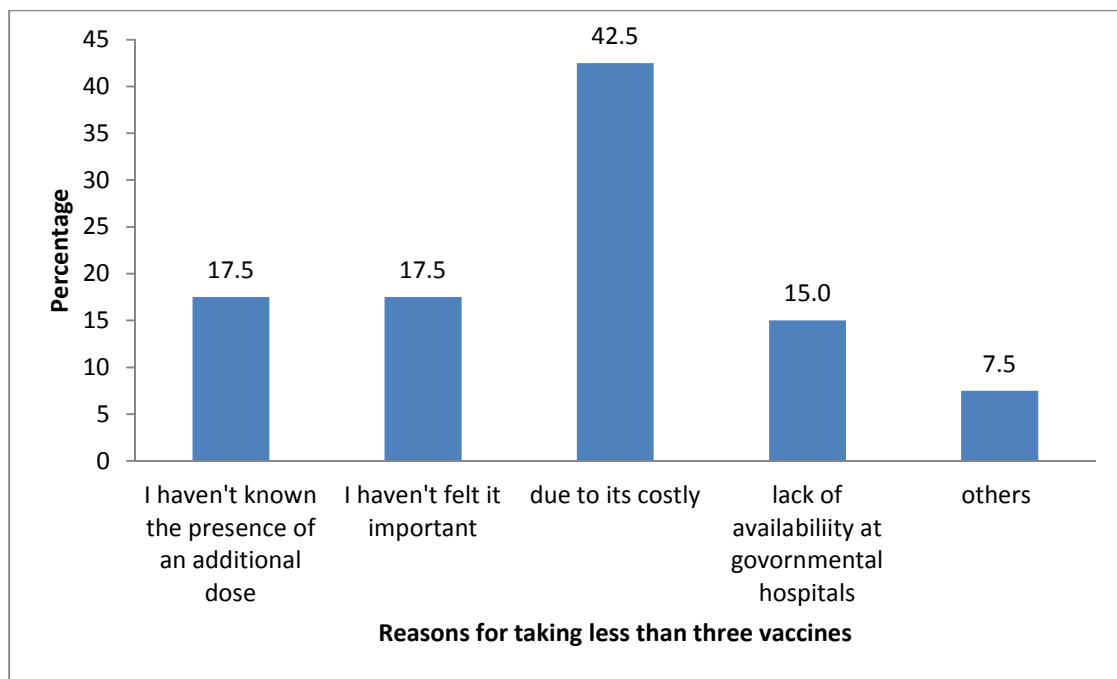


Figure 8: Reasons for taking less than the three protective doses of nurses at Addis Ababa governmental hospitals, June, 2015.

5.6 Factors associated with knowledge about HB vaccination

To identify factors associated with knowledge about HB vaccine, model chi-squares were checked. According to the predicted probabilities, logistic regression model was fitted.

On binary logistic regression analysis, causal benefit based relationship, the hospital where the participant is working, the working ward of participant at the hospital, exposure to needles and sharp injure were associated with the knowledge of participant about the vaccine.

The hospitals where the study participants were working had statistically significant association with the knowledge about HB vaccine. Those study participants working at Gandhi hospital were 3.89 times more knowledgeable than those working at Black lion hospital (COR=3.89 [95% C.I :1.42-10.68]). Those study participants working at Rasdesta hospital are also 6.40 times more knowledgeable than those working at Black lion hospital (CO=6.40 [95%C.I :1.73-23.67]).

The binary logistic regression also indicated that knowledge about the vaccine was associated with the ward where study participants were working. Those study participants working at the inpatient and outpatient wards are 0.39 and 0.33 times respectively less knowledgeable about the vaccine

than those working at the OR (COR=0.39[95%C.I: 0.18-0.83] in case of inpatient ward; COR=0.33[95%C.I: 0.14-0.74] in case of outpatient ward)

The other significant association obtained from binary logistic regression was knowledge about the vaccine and history of needles and sharp object injury. Those study participants who have had history of needles and sharp injury in the past 12 months were 2.30 times more knowledgeable about the vaccine than those who had no the injury (COR=2.30 [95%C.I:1.41-3.76]).

Finally after obtaining statistically significant variables at $p < 0.05$ in binary logistic regression analysis, multi variable logistic regression was carried out to see the independent predictors of knowledge about the vaccine. After adjusting for potential confounders having history of needles and sharp object injury in the past 12 months (AOR=2.05[95%C.I:1.23-3.44]), the hospital where study participant was working (AOR=3.71[95%C.I:1.30-10.58]) in case of Gandhi and AOR=6.85[95%C.I:1.77-26.45]) in case of Rasdesta) and the ward where the study participant was working (AOR=0.41[95%C.I:0.19-0.91] in case of inpatient ward; AOR=0.32[95%C.I:0.13 0.75] in case of outpatient ward) were independent predictors of knowledge about the vaccine (**Table 7**).

Table 7: Association of knowledge about HB vaccine with socio demographic factors and perceived risk of acquiring HB Infection among nurses working at Addis Ababa governmental hospitals, Addis Ababa, June, 2015

Variables	Knowledge of hepatitis B vaccine				Odds Ratio (95% CI)	
	Good Knowledge		Poor Knowledge		Crude	Adjusted
	N	%	N	%		
Sex						
Male	48	36.6	51	36.2	1.02(0.62-1.67)	
Female	83	63.4	90	63.8	1	
Age						
20-29	85	64.9	95	67.4	0.42(0.16-1.07)	
30-39	26	19.8	33	23.4	0.37(0.13-1.03)	
40-49	5	3.8	6	4.3	0.39(0.09-1.72)	
≥50	15	11.5	7	5.0	1	
Marital status						
Single	60	45.8	48	34.0	0.83(0.13-5.19)	
Married	68	51.9	91	64.5	0.50(0.08-3.06)	
Separated	3	2.3	2	1.4	1	



Religion						
Orthodox	80	61.1	84	59.6	1	
Muslim	33	25.2	19	13.5	1.83(0.96-3.47)	
Protestant	18	13.7	38	20.7	0.50(0.26-1.94)	
Educational status						
Diploma	33	25.2	34	24.1	1.06(0.61-1.84)	
Degree &Msc	98	74.8	107	75.9	1	
Hospitals						
Gandi	17	13.0	6	4.3	3.89(1.42-10.68)*	3.71(1.30-10.58)*
Rasdesta	14	10.7	3	2.1	6.40(1.73-23.67)*	6.85(1.77-26.45)*
St.Paul	22	16.8	24	17.0	1.26(0.63-2.53)	1.33(0.64-2.75)
Zewiditu	35	26.7	49	34.8	0.98(0.55-1.76)	1.08(0.59-2.00)
Black lion	43	32.8	59	41.8	1	1
Working unit						
In patient	54	41.2	69	48.9	0.39(0.18-0.83)*	0.41(0.19-0.91)*
Out patient	26	19.8	40	28.4	0.33(0.14-0.74)*	0.32(0.13-0.75)*
Emergency	25	19.1	19	13.5	0.66(0.27-1.61)	0.65(0.26-1.65)
OR	26	19.8	13	9.2	1	1
Service Years						
<10	100	76.3	116	82.3	0.66(0.28-1.58)	
10-19	18	13.7	15	10.6	0.92(0.32-2.69)	
≥20	13	9.9	10	7.1	1	
Monthly income						
<2600	34	26.0	37	26.2	0.79(0.40-1.61)	
2600-3445	44	33.6	62	44.0	0.62(0.32-1.18)	
3446-4289	23	17.6	16	11.3	1.25(0.55-2.85)	
≥4290	30	22.9	26	18.4	1	
History of occupational exposure to conditions that predispose to HBV infection and training on infection prevention						
History of exposure to blood or body fluids on intact skin						
Yes	86	65.6	90	63.8	1.08(0.66-1.78)	
No	45	34.4	51	36.2	1	
History of splash to blood or body fluids to eye or mouth						
Yes	46	35.1	41	29.1	1.32(0.79-2.20)	
No	85	64.9	100	70.9	1	



History of splash of blood on cuts or unprotected skin						
Yes	43	32.8	62	44.0	0.62(0.38-1.02)	
No	88	67.2	79	56.0	1	
History of needles and sharp object injures						
Yes	69	52.7	46	32.6	2.30(1.41-3.76)*	2.05(1.23-3.44)*
No	62	47.3	95	67.4	1	1
Training on infection prevention						
Yes	85	64.9	86	61.0	1.18(0.72-1.94)	
No	46	35.1	55	39.0	1	

Significant at $p < 0.05$ (2-tailed), COR= Crude Odds Ratio, AOR= Adjusted Odds Ratio

5.7 Factors associated with vaccination status

To identify factors associated with vaccination status of study participants, model chi-squares were checked. According to the predicted probabilities, logistic regression was fitted.

On binary logistic regression analysis, causal/benefit based relationships, the hospital where the participant was working (Gandi, Rasdesta), the ward where the participants were working, participants history of exposure to needles and sharp injures in the past 12 months and knowledge about HB vaccine were associated with the vaccination status of respondents.

Those study participants working at Gandhi hospital were 6.50 times more likely to be vaccinated than those working at Black lion hospital (COR=6.50[95% C.I:2.45-17.23]). Similarly those study participants working at Rasdesta hospital were 9.17 times more likely to be vaccinated than those working at Black lion hospital (COR=9.17[95% C.I:2.98-28.17]). In the contrary those study participants working at inpatient and outpatient wards are less likely to be vaccinated than those working at operation room (COR=0.26[95% C.I:0.12-0.55] and COR=0.19[95% C.I:0.75-0.47] respectively).

Those study participants who has had exposure to needles and sharp injures in the past 12 months were 7.81 times more likely to be vaccinated than those who have no the exposure (COR=7.81[95%C.I:4.09-14.92]).

On binary logistic regression strong association was also obtained for vaccination status of participants and knowledge about HBV vaccine. Those study participants who had good knowledge about HBV vaccine were 5.53 times more likely to be vaccinated than those who had poor knowledge about HBV vaccine(COR=5.53[95%C.I:2.92-10.48]).

Finally after obtaining statistically significant variables at $p < 0.05$ in binary logistic regression analysis, multi variable logistic regression was carried out to see the independent predictors of vaccination status of respondents. After adjusting for potential confounders the hospital where the study participants were working (AOR=6.98[95%C.I:2.03-24.04] in case of Gandi; AOR=10.94[95%C.I:2.93-40.89] in case of Rasdesta; AOR=2.67[95%C.I:1.06-6.71] in case of Zewditu). The ward the study participants were working (AOR=0.16[95%C.I:0.58-0.46] in case of inpatient; AOR=0.18[95%C.I:0.59-0.55] in case of outpatient), history of needles and sharp injures in the past 12 months (AOR=8.46[95%C.I:3.94-18.16]) and knowledge about HBV vaccine(AOR=3.67[95%C.I:1.71-7.87])) were found to be independent predictors of vaccination status of study participants (**Table 8**).

Table 8: Association of vaccination status with socio demographic and other factors among nurses working at Addis Ababa governmental hospitals, Addis Ababa, June, 2015

Variables	Vaccination status				Odds Ratio (95% CI)	
	Vaccinated		Unvaccinated		Crude	Adjusted
	N	%	N	%		
Sex						
Male	23	34.3	76	37.1	0.89(0.50-1.58)	
Female	44	65.7	129	62.9	1	
Age						
20-29	44	65.7	136	66.3	1.46(0.47-4.53)	
30-39	17	25.4	42	20.5	1.82(0.54-6.18)	
40-49	2	3.0	9	4.4	1.00(0.15-6.53)	
≥50	4	6.0	18	8.8	1	
Marital status						
Single	27	40.3	81	39.5	1	



Married	38	56.7	121	59.0	0.94(0.53-1.66)	
Separated	2	3.0	3	1.5	2(0.32-12.61)	
Religion						
Orthodox	43	64.2	121	59.0	1.64(0.76-3.52)	
Muslim	14	20.9	38	18.5	1.70(0.68-4.25)	
Protestant	10	14.9	46	22.4	1	
Educational status						
Diploma	13	19.4	54	26.3	0.67(0.34-1.33)	
Degree & Msc	54	80.6	151	73.7	1	
Hospitals						
Gandi	13	19.4	10	4.9	6.50(2.45-17.23)*	6.98(2.03-24.04)*
Rasdesta	11	16.4	6	2.9	9.17(2.98-28.17)*	10.94(2.93-40.89)*
St. Paul	7	10.4	39	19.0	0.89(0.34-2.34)	1.04(0.34-3.16)
Zewiditu	19	28.4	65	31.7	1.46(0.71-3.03)	2.67(1.06-6.71)
Black lion	17	25.4	85	41.5	1	1
Working unit						
In patient	24	35.8	99	48.3	0.26(0.12-0.55)*	0.16(0.58-0.46)*
Out patient	10	14.9	56	27.3	0.19(0.08-0.47)*	0.18(0.59-0.55)*
Emergency	14	20.9	30	14.6	0.49(0.20-1.20)	0.33(0.11-1.03)
OR	19	28.4	20	9.8	1	1
Service year						
<10	52	77.6	164	80.0	2.11(0.60-7.40)	
10-19	12	17.9	21	10.2	3.81(0.93-15.53)	
≥20	3	4.5	20	9.8	1	
Monthly income						
<2600	18	26.9	53	25.9	1	
2600-3445	24	35.8	82	40.0	0.86(0.43-1.74)	
3446-4289	6	9.0	33	16.1	0.54(0.19-1.49)	
≥4290	19	28.4	37	18.0	1.51(0.70-3.26)	
History of occupational exposure to conditions that predispose to HBV infection and training on infection prevention						



History of exposure to blood or body fluids on intact skin						
Yes	45	67.2	131	63.9	1.16(0.64-2.07)	
No	22	32.8	74	36.1	1	
History of splash to blood or body fluids to eye or mouth						
Yes	25	37.3	62	30.2	1.37(0.77-2.45)	
No	42	62.7	143	69.8	1	
History of splash of blood on cuts or unprotected skin						
Yes	26	38.8	79	38.5	1.01(0.57-1.78)	
No	41	61.2	126	61.5	1	
History of needles and sharp injures						
Yes	52	77.6	63	30.7	7.81(4.09-14.92)*	8.46(3.94-18.16)*
No	15	22.4	142	69.3	1	1
Training on infection prevention						
Yes	45	67.2	126	61.5	1.28(0.72-2.30)	
No	22	32.8	79	38.5	1	
Knowledge about HB infection						
Good	35	52.2	115	56.1	0.86(0.49-1.49)	
Poor	32	47.8	90	43.9	1	
Knowledge about HB vaccination						
Good	52	77.6	79	38.5	5.53(2.92-10.48)*	3.67(1.71-7.87)*
Poor	15	22.4	126	61.5	1	1

Significant at $p < 0.05$ (2-tailed), COR= Crude Odds Ratio, AOR= Adjusted Odds Ratio

6. Discussion

This study assessed the knowledge of nurses working at governmental hospitals of Addis Ababa about HBV vaccine and their vaccination status against the disease. The study also revealed different factors affecting the knowledge of participants about the vaccine and their vaccination status.

The finding of this study indicated that 131(48.2%) of the study participants had good knowledge about HB vaccine which is lower than the finding of the study conducted in Bahirdar city administration to assess HB vaccine knowledge and vaccination status among health care workers where 62% of the study participants were knowledgeable about the vaccine(28). But the finding of this study is also different from the findings from Nigeria conducted to assess the knowledge, attitude and practice of HBV vaccination among health care workers where 70.2% of the study participants had good knowledge about the HBV vaccine. In the Nigeria study 67.9% knew there is effective vaccine for HBV, 86.9% knew HBV vaccine is 95% effective if used in complete dose and 36.9% knew HBV is 100% more infective than HIV which is not in line with this study where 93% of participants knew there is effective vaccine for HBV, 76.8% knew HBV vaccine is 95% effective if used in complete dose and 82.7% knew HBV is 100% more infective than HIV through needle and stick injury. The difference could be due to differences to the extent of exposure to health information and the heterogeneous nature of health professionals involved in the studies (27).

The finding of this study indicated those study participants who has had history of exposure to needles and sharp injury in the past 12 months were 2.05 times more knowledgeable than those who had not the history (AOR=2.05 [95%C.I:1.23-3.44]). The reason for this may be the exposure might provoke the respondents to read and ask about the diseases that are transmitted through needle and stick injury. Their reading may made them grasp the knowledge about HBV infection and its prevention mechanisms.

This study also indicated those study participants working at Gandhi and Rasdesta hospitals were 3.71 and 6.85 times more knowledgeable about HBV vaccine respectively than those working at Black lion hospital (AOR=3.71[95%C.I:1.30-10.58] in case of Gandhi; AOR=6.85[95%C.I:1.77-26.45] in case of Rasdesta). The reasons for this difference might be the differences on the level of in-service training given to nurses about disease and their prevention and the value given to health education on the respective hospitals. The other reason especially in case of Gandhi hospital might

be the attention given by the government to the service provided by Gandhi hospital. The hospital services provided by Gandhi hospital focuses more on maternal and child health which is one main component of government policy.

This study also indicated those study participants working at outpatient and inpatient wards of the hospitals were 0.32 and 0.41 times less knowledgeable about HBV vaccine respectively than those working at OR (AOR=0.32[95%CI:0.13-0.75] in case of outpatient ward; AOR=0.41[95%CI:0.19-0.91] in case of inpatient ward). The reason for this might be those study participants working at OR might think they were at increased risk of acquiring diseases transmitted through contacts to blood like HBV and read more about their prevention mechanisms.

On vaccination status of respondents against HBV this study found only 67(24.6%) of the study participants were vaccinated. Out of the vaccinated 67 respondents only 24 (8.82%) were fully vaccinated but the rest 43(15.51%) were partially vaccinated. This finding is almost similar to the Bahirdar study where only 37(10%) were vaccinated and out of which only 20(5.4%) were fully vaccinated. In both the finding of this study and the finding of the Bahirdar study the vaccination status is too low even though a bit higher on this study(28). The reasons for this similarity might be similarities on the access to the vaccine.

This study indicated vaccination status of respondents was very low in comparison to other studies conducted in Burkina Faso (where 58.6% were partially vaccinated and 10.9% were fully vaccinated), Nigeria (where 65% vaccinated), Syria (where 76.6% were vaccinated), Morocco (where 55% were vaccinated), north India (where 60% were vaccinated, 40% fully vaccinated), Greece (where 57.1% were vaccinated) and USA (where 75% were fully vaccinated) (12, 25, 26, 29, 31, 35). The reasons for these differences might be the differences in the health care system of the countries, differences in the cost of the vaccines on the countries and most importantly differences in the composition of professions of participants (most of the studies mentioned were conducted in health care workers in contrast to this study which picked only nurses as study participants).

Regarding the reasons not to be vaccinated against HBV out of those 205 (75.4%) unvaccinated respondents 72(35.1%) mentioned cost of the vaccine, 61(29.8%) mentioned unavailability of the vaccine through government channels, 35(17.1%) mentioned not feeling the vaccine as protective, 31 (15.1%) mentioned not knowing the presence of vaccine and 6(2.9%) mentioned being new employ, negligence and fear of side effect as reasons for not being vaccinated. The reasons

mentioned were more or less similar to the reasons mentioned on studies conducted in north India (mentioned negligence (41.6%) and lack of knowledge about the vaccine as reasons not be vaccinated (45%)), Pakistan (mentioned reasons like work pressure (39.8%), negligence (38.8%), unaffordability (20.9%), and unavailability (0.5%)) and Nigerian dental surgeons (mentioned lack of opportunity and fear of side effects of the vaccine)(12, 32, 34). This difference in type and magnitude of reasons for not being vaccinated are expectable due to differences in health care system of the countries, living style and standard of participants living in the mentioned countries and the involvement of different types of health professionals on the studies mentioned. The main reason for not being vaccinated in the Bahirdar study was also unavailability of the vaccine through government channels which is also one reason for not being vaccinated in this study too even though the vaccine is available in private clinics and pharmacies of Addis Ababa (28).

The result of this study revealed among those 67 vaccinated participants 27(9.93%) received three doses but the rest received either two doses 25(9.20%) or one dose 15(5.51%). But a study conducted in north India indicated among vaccinated health personnel 40% received the full three doses and 20% received either two doses or one dose (12). A study conducted among dental surgeons in Nigeria also indicated out of those vaccinated study participants 20% had received the full three doses and 48.6% received either two doses or single dose of the vaccine(34). With this regard as well the number of participants who took the full protective dose of the vaccine is low in this study. The reasons mentioned above like differences in the composition of health professionals involved in the studies, living standards and style of living and even differences in the sample size may be attributable to the differences of those study participants on the number of doses taken.

This study indicated the reasons for not taking the complete three doses among those who were vaccinated included unaffordability (cost) of the vaccine (42.5%), not knowing the presence of additional dose (17.5%), not feeling intake of additional dose important (17.5%), unavailability of the vaccine at governmental channels (15.0%) and other reasons (7.5%) like fear of side effects and waiting for the next dose. Even though there magnitude is different the reasons mentioned in this study are similar to the findings of the studies conducted in India (where 45% cited lack of knowledge about the total no of doses to be taken for full protection)(12) and Pakistan (where the participants mentioned work pressure (39.8%), negligence (38.8%), unaffordability (20.9%) and unavailability of the vaccine (0.5%) as reasons for not taking the full three protective doses) (32).

The finding of this study indicated that vaccination status of respondents was significantly associated with the hospital where the participant is working, the ward in the hospitals the participant is working, history of exposure to needles and sharp injury in the past 12 months and knowledge of respondents about the vaccine. Those study participants working in Gandhi, Rasdesta and Zewditu hospitals were 6.98, 10.94 and 2.67 times respectively more likely to be vaccinated than those working at Black lion hospital (AOR=6.98[95% CI: 2.03-24.04] in case of Gandhi, AOR=10.94[95% CI: 2.93-40.89] in case of Rasdesta and AOR=2.67[95% CI: 1.06-6.71] in case of Zewditu). The reason for this might be due to better accesses of the vaccine to study participants working in Gandhi, Rasdesta and Zewditu hospitals. Likewise those study participants working at inpatient and outpatient wards of the hospitals were 0.16 and 0.18 times respectively less likely to be vaccinated than those who were working at OR (AOR= 0.16 [95% CI:0.58-0.46] in case of inpatient ward and AOR=0.18[95% CI: 0.59-0.55] in case of outpatient ward). The reason for this might be those study participants who work at the OR might think they were at increased risk of acquiring diseases that are transmitted through contact with blood and take the necessary measure for protection.

This study also revealed those study participants who has had history of needles and sharp injury were 8.33 times more likely to be vaccinated than those who do not had the injury (AOR= 8.46 [95% CI: 3.94-18.16]). The reason for this might be those individuals who have had needle and sharp injuries were more likely to search for methods of prevention of diseases that are acquired through needles and sharp injury. Finally this study found strong association between knowledge of respondents about the vaccine and their vaccination status. Accordingly those study participants who have had good knowledge about the vaccine were 3.67 times more likely to be vaccinated than those who had poor knowledge (AOR= 3.67 [95% CI: 1.71-7.87]). The reason for this might be those study participants who were well informed about the vaccine were more likely to utilize it because they had a good knowledge about its safety and efficacy.

7. Strength and Limitation of the Study

7.1 Strength of the study

- Adequate sample size representing nurses working on the hospitals were taken by using appropriate sampling techniques.
- The utilization of appropriate statistical methods to minimize biases was made and the data was analyzed using appropriate statistical test

7.3 Limitations of the Study

- Shortage of domestic literatures done in related study area
- Qualitative study design was not hired
- The attitude of study participants about HB vaccine which might affect the vaccination status of respondents is not assessed
- Since this study used a cross sectional study design, it is difficult to infer causal association.

8. Conclusion and Recommendations

8.1 Conclusion

This study found that knowledge about the vaccine unsatisfactory. Around half of study participants found to have poor knowledge about the vaccine which is very low when viewed with the educational level of study participants.

This study also found the vaccination status of respondents to be very low. It is very low even in comparison to fellow African countries. Among those study participants who were considered vaccinated more than half had not receive the full protective dose. This is very low figure especially when we consider the long term severity of the disease and the increased exposure risk of study participants.

This study also found those study participants with increased knowledge about the vaccine are more likely to be vaccinated than those who were more knowledgeable.

8.2 Recommendations

Based on the finding from this study, the following recommendations are made.

For Ministry of Health

- Hepatitis B prevention and control implementation guideline and hepatitis B data has to be derived, and from this guideline each concerned bodies including hospitals could work out their own strategy on hepatitis B
- Hepatitis B training package should be prepared to mainstream hepatitis B related issues to health care professionals including nurses working in hospitals.
- The ministry should also work to avail HB vaccine by reasonable cost through governmental channels

For governmental Hospitals

- The management of the hospitals should work to build the capacity of the nurses through different mechanisms including training in collaboration with other concerned bodies.

For Researchers

- A study which assesses the knowledge of nurses about HB vaccine, their vaccination status and associated factors should be undertaken on study participants with large sample size
- Further study is needed to investigate the attitude of participants about HB vaccine because this study indicated the vaccination status is very low inspite of relatively better knowledge about the vaccine
- This study should be duplicated with health professionals with different composition to see differences in vaccination status among different health professionals

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Appendix

Annex I: Information Sheet

Addis Ababa University College of Health Science,

School of Allied Health Sciences

Department of Nursing and Midwifery

Here, I the undersigned, at Addis Ababa University College of Health Science, School of Allied Health Sciences Department of Nursing and Midwifery Graduate studies Program, currently I will be undertaking research entitled assessment of the knowledge about Hepatitis B vaccine and vaccination status of nurses against Hepatitis B Virus at governmental hospitals of Addis Ababa. For this study you are selected as a participant and before getting your consent or permission of your participation you need to know all necessary information related to the study. Thus, this information will be detailed as;

Objective: to assess the knowledge about Hepatitis B vaccine and vaccination status of nurses against Hepatitis B Virus and factors associated with it at governmental hospitals of Addis Ababa.

Significance of the study: This study is important in providing ways to prevent Hepatitis B viral infection based on the gap in knowledge about the HB vaccine and vaccination status among nurses.

Participants: Selected nurses working at five governmental hospitals of Addis Ababa.

Confidentiality: All information you give will be kept confidential and won't be accessible to any third party. You are not asked to write your name on the questionnaire sheet so that you will not be identified.

Risks: The procedure doesn't bear any physical or psychological trauma on you. You will not be forced to respond to the information you do not know.

Benefits:For your participation in the study no payment will be granted. But, participating in the study and giving your information to questions asked will have great input in efforts to describe the knowledge about HB vaccination and vaccination status of the study population towards hepatitis B viral infection.

Your participation is voluntary and you are not obligated to answer any question you do not wish to answer. If you feel discomfort with the question, it is your right to drop it any time you want. If you have questions regarding this study or would like to be informed of the results after its completion, please feel free to contact the principal investigator.

Address of the principal investigator:

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Email: khedija2008@gmail.com

Address of Addis Ababa University, Faculty of Medicine, Institutional Review Board:

Telephone number: 0115538734,

E-mail: aaumfirb@yahoo.com

Data collector's name _____

Signature _____ Date _____

Annex II: Consent Form

In signing this document, I am giving my consent to participate in the study entitled “Assessment of the knowledge about Hepatitis B vaccine and vaccination status of nurses against Hepatitis B Virus at governmental hospitals of Addis Ababa”. I have been informed that the purpose of this study is to assess the knowledge about Hepatitis B vaccine and vaccination status of nurses against Hepatitis B Virus at governmental hospitals of Addis Ababa; Ethiopia, 2015. I have understood that participation in this study is entirely voluntarily. I have been told that my answers to the questions will not be given to anyone else and no reports of this study ever identify me in any way. I have also been informed that my participation or non-participation or my refusal to answer questions will have no effect on me. I understood that participation in this study does not involve risks.

I understood that KedijaMuzeyinis the contact person if I have questions about the study or about my rights as a study participant.

Address of the principal investigator:

KedijaMuzeyin

Mobile number: +251 913 904996

E-mail: khedija2008@gmail.com

Address of Addis Ababa University, Faculty of Medicine, Institutional Review

Board:

Telephone number: 0115538734

E-mail: aaumfirb@yahoo.com

Respondent's signature: _____ Date: _____

Data collector signature: _____ Date: _____

If no, skip to the next participant by writing reasons for his/her refusal.

Results of questionnaire

1. Completed
2. Respondent not available
3. Refused
4. Partially completed

Identification

Questionnaire No. _____

Supervisor's name _____ signature _____

Annex III: Questionnaire

Addis Ababa University, Faculty of Medicine, Centralized School of Nursing

Study prepared to collect data on the knowledge about Hepatitis B vaccine and vaccination status of nurses against Hepatitis B Virus at governmental hospitals of Addis Ababa

This questionnaire has 5 sections: section 1 nurses' socio-demographic characteristics; section 2 Perceived risk of acquiring hepatitis B infection among nurses and related factors; section 3 Knowledge about Hepatitis B infection; section 4 Knowledge about Hepatitis B vaccination and section 5 Vaccination status of nurses.

Please read each item carefully and give your honest response to each item. If you overlook any item without response, it will affect the study. So, please check that you have given response to all items.

I thank you for your genuine responses and cooperation.

Section 1: Socio-demographic characteristics of the respondents

1. Ward, where are you working now? _____
2. Age _____
3. Sex
 - A. Male
 - B. Female
4. Religion
 - A. Orthodox
 - B. Muslim
 - C. Catholic
 - D. Protestant
 - E. Other, specify _____
5. Marital status
 - A. Married
 - B. Single
 - C. Divorced/Separated
 - D. Widowed
6. Educational level
 - A. Diploma
 - B. Degree (BSc)
 - C. Master degree
 - D. Others, specify? _____
7. How long have you been in Service? _____ years.
8. Monthly income _____ Ethiopian birr.

Section B: History of occupational exposure to conditions that predispose to HBV infection among nurses and training on infection prevention

1. Have you ever had history of exposure to blood or body fluids on intact skin?
 - A. Yes
 - B. No
2. Have you ever had history of splash of blood or body fluids to eye or mouth in the past 12 months?
 - A. Yes
 - B. No
3. Have you ever had history of splash of blood on cuts or unprotected skin?
 - A. Yes
 - B. No
4. Have you ever taken training on infection prevention?
 - A. Yes
 - B. No
5. If yes, how many times?
 - A. once
 - B. more than once

Section C: Knowledge of nurses about Hepatitis B infection

1. Do you know or have you heard of Hepatitis B virus?
 - A. Yes
 - B. No
2. Which part of our organ is affected by HBV?
 - A. Liver
 - B. Heart
 - C. Kidneys
 - D. Brain
 - E. Not sure
3. The symptoms of hepatitis B viral infection appear within few days Always after the entrance of Hepatitis B virus to the body
 - A. Yes
 - B. No
4. Route of transmission of Hepatitis B infection (answer each of the following choices)
 - A. Blood and blood products?
 - i. yes
 - ii. No
 - B. Needles and sharps injury?
 - i. Yes
 - ii. No
 - C. Sexual intercourse?
 - i. Yes
 - ii. No
 - D. Vertically from mother to child?
 - i. Yes
 - ii. No
 - E. Faeco-oral?
 - i. Yes
 - ii. No
 - F. Contaminated water?
 - i. Yes
 - ii. No
 - G. Other specify _____
5. There is a higher risk of Hepatitis B than HIV transmission through needle stick injury.
 - A. Yes
 - B. No

6. Ways of preventing Hepatitis B infection can be through (answer each of the following choices)

A. Vaccination?

i. Yes

ii. No

B. Practicing standard working precaution?

i. Yes

ii. No

C. Avoiding needle/sharp injury?

i. Yes

ii. No

D. Avoid unsafe sex?

i. Yes

ii. No

E. Avoid drinking contaminated water?

i. Yes

ii. No

F. Avoid foods not well cooked?

i. Yes

ii. No

iii. Other specify _____

Section D: Knowledge of nurses about hepatitis B vaccine

Knowledge about hepatitis B vaccine questions	Yes	No
1. There is effective vaccine to prevent hepatitis B infection.		
2. Hepatitis B vaccine can be given as post-exposure prophylaxis.		
3. Hepatitis B vaccine is contra indicated for immune compromised patients.		
4. Hepatitis B vaccine is effective to treat patients with acute hepatitis B infection.		
5. Hepatitis B vaccine is highly effective in preventing hepatitis B infection if given within 48 hours after exposure.		
6. qwHepatitis B vaccine should be given to health care workers as part of work place safety		
7. Full course of hepatitis B vaccine may give lifelong immunity but for Health professionals, one further booster after 5 years of the first dose is recommended.		
8. After taking full dose vaccination of hepatitis B, there is no need for a blood test to confirm immunity against hepatitis B		
9. Full dose hepatitis B vaccine provides 100% protection for 90% of adults		
10. Full dose hepatitis B vaccine protects against HBV for at least 15 years		
11. Hepatitis B vaccine causes problems if given to people who are already immune		
12. Hepatitis B vaccine is recommended for all health care workers.		

13. How many doses of hepatitis vaccine are there?

A. One dose

C. Three doses

B. Two doses

D. Four doses

14. If more than 1 for Q13, specify the gap between each dose _____

Section E: Vaccination status

1. Have you vaccinated against HBV?
 - A. Yes
 - B. No
2. If No for Q. 1. Why?
 - A. I haven't felt it protective
 - B. It is very costly
 - C. unavailability of the vaccine through governmental channels
 - D. I haven't known the presence of vaccine
 - E. Others, specify _____
3. If yes for Q. 1. How many doses have you taken?
 - A. 1
 - B. 2
 - C. 3
 - D. >3
 - E. I don't remember
4. If you take 3 doses, specify the gap time between the 1st and 2nd dose? _____,
the 2nd and 3rd does? _____
5. If < 3, why have you not completed?
 - A. I haven't known the presence of additional dose
 - B. I haven't felt it important.
 - C. Due to the cost
 - D. unavailability of the vaccine through governmental channels
 - E. Fear of side effect
 - F. Others-----